

## AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for providing a virtual environment for simulating the arrangement of a plurality of parts into an assembly, comprising:

(a) creating a model in a design environment for each part, each model having a geometry that corresponds to a part;

(b) translating each model into a virtual part in the virtual environment, the design environment being integrated with the virtual environment; ~~and~~

b1 (c) obtaining data representing one or more physical properties, including mass properties, of at least one virtual part;

(d) determining a variable representative of a force associated with at least one virtual part, wherein the variable representative of the force is calculated by the use of the data representing one or more physical properties;

(e) enabling each virtual part to be positioned in an assembly within the virtual environment, wherein the positioning of each virtual part enables a ~~constrained~~ motion simulation to be performed for the arrangement of the plurality of parts into the assembly; ~~wherein the constrained motion simulation limits the simulated motion of at least one virtual part to an allowed direction; and~~

(f) controlling the motion simulation by limiting the movement of at least one virtual part if the variable representative of a force is greater than a predetermined value.

2. (Original) The method of Claim 1, further comprising, enabling the simulation to be modified, a modification enabling another simulation to be performed, and when the modification causes a change in the virtual part, causing the corresponding model to automatically include the change to the virtual part.

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>LLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100

3. (Currently amended) The method of Claim 1, further comprising, receiving a user controlled command by a virtual reality peripheral device for arranging [[of ]] the plurality of parts into the assembly.

4. (Original) The method of Claim 1, wherein the virtual environment is formed by a generation of three-dimensional views.

5. (Original) The method of Claim 1, further comprising, providing a menu display in the virtual environment, the menu display configured to receive commands from a user by the use of a virtual reality peripheral device.

6. (Original) The method of Claim 1, further comprising, translating a constraint information set of the plurality of parts from a parametric computer aided system to the virtual environment.

7. (Original) The method of Claim 6, wherein the constraint information set comprises multiple constraint values.

8. (Original) The method of Claim 6, wherein the constraint information set is used to define kinematic motions of the virtual parts.

9. (Original) The method of Claim 1, further comprising, translating a geometry information set of the plurality of parts from a parametric computer aided system to the virtual environment.

10. (Currently amended) The method of Claim 1, wherein the method further comprises, A method for processing a constraint information set for limiting the motion of a part associated with the constraint information set, wherein processing comprises comprising:

comparing the part constraint information set with a predetermined constraint information set; and

limiting the motion of the part to only move about an axis, if the predetermined constraint information set dictates a limitation about an axis coordinate.

11. (Currently amended) The method of Claim 1, wherein the method further comprises, ~~A method for processing a constraint information set for~~ limiting the motion of a part associated with the constraint information set ~~by, comprising:~~

comparing the constraint information set with a predetermined constraint information set;  
and

limiting the motion of the part to only move about a plane, if the predetermined constraint information set dictates a limitation about a plane.

12. (Currently amended) The method of Claim 1, wherein the method further comprises:

~~A method for processing multiple constraint information sets for simulating the moment of a first and second part in a computer simulated virtual environment, wherein a first constraint information set is associated with the first part, and wherein a second constraint information set is associated with the second part;~~the method comprising:

determining the presence of a predetermined type of movement between the first and second parts; and

associating the first and second constraint information sets, if there is a presence of a predetermined type of movement between the first and second parts.

13. (Original) The method of Claim 12, further comprising:

determining the presence of redundant data in the first and second constraint information sets; and

determining the presence of a predetermined type of movement between the first and second coordinate indicator, if the first and second constraint information sets do not contain redundant information.

14. (Original) The method of Claim 12, wherein the first and second constraint information sets define an axis.

15. (Original) The method of Claim 12, wherein the first and second constraint information sets define a plane.

B1 16. (Original) The method of Claim 12, wherein the predetermined type of movement includes a first and second constraint information each define a first and second axis, wherein the first and second axis are parallel with respect to each other.

17. (Original) The method of Claim 12, wherein the predetermined type of movement includes a first and second constraint information each define a first and second plane, wherein the first and second planes are not parallel with respect to each other.

18. (Original) The method of Claim 12, wherein associating the first and second constraint information sets includes snapping the first part with the second part.

19. (Currently amended) A system for providing a virtual environment, the system comprising:

(a) a parametric computer aided drawing system having an avatar communicatively connected the parametric computer aided drawing system;

(b) a virtual assembly design environment system communicatively connected the parametric computer aided drawing system;

(c) program code for simulating the arrangement of a plurality of parts into an assembly in a virtual environment, which when executed, perform the steps of:

(i) creating a model in a design environment for each part, each model having a geometry that corresponds to a part;

(ii) translating each model into a virtual part in the virtual environment, the design environment being integrated with the virtual environment; ~~and~~

(iii) obtaining data representing one or more physical properties, including mass properties, of at least one virtual part;

31 (iv) determining a variable representative of a force associated with at least one virtual part, wherein the variable representative of the force is calculated by the use of the data representing one or more physical properties;

(v) enabling each virtual part to be positioned in the virtual environment, the positioning of each virtual part enables a simulation to be performed for the arrangement ~~arranging~~ of the plurality of parts into the assembly; and

(vi) controlling the simulation to be performed for the arrangement of the plurality of parts into the assembly by limiting the movement of at least one virtual part if the variable representative of a force is greater than a predetermined value.

20. (Original) The method of Claim 19, wherein the program code, which when executed, further performs the step of, enabling the simulation to be modified, a modification enabling another simulation to be performed, and when the modification causes a change in the virtual part, causing the corresponding model to automatically include the change to the virtual part.

21. (Original) The system of Claim 19, further comprising a database containing information pertaining to trajectory and sequence information for each part.

22. (Original) The system of Claim 19, wherein the avatar includes one or more virtual reality peripheral devices for generating electronic signals that dictate the movement of a user.

23. (Original) The method of Claim 19, wherein the program code further performs the step of providing a menu display in the virtual environment, the menu display configured to receive commands from a user.

24-31. (Canceled)

32. (Currently amended) A method for providing a virtual environment for simulating the arrangement of a plurality of parts into an assembly, comprising:

(a) creating a model in a design environment for each part, each model having a geometry that corresponds to a part;

(b) translating each model into a virtual part in the virtual environment, the design environment being integrated with the virtual environment;

(c) obtaining data representing one or more physical properties, including mass properties, of at least one virtual part;

(d) determining a variable representative of a force associated with at least one virtual part, wherein the variable representative of the force is calculated by a product of the data representing the mass properties and a data value representative of an angular acceleration of at least one virtual part;

(e) enabling each virtual part to be positioned in an assembly within the virtual environment, wherein the positioning of each virtual part enables a simulation to be performed for the arrangement of the plurality of parts into the assembly, ~~wherein the simulation processes constraint information for limiting the motion of at least one virtual part associated with the constraint information;~~

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>LLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100

(d) ~~comparing the constraint information with a predetermined constraint information set, and~~

(e) ~~limiting the motion of the virtual part associated with the constraint information to only move in a direction defined in the predetermined constraint information~~

31 (f) controlling the simulation to be performed for the arrangement of the plurality of parts into the assembly by limiting the movement of at least one virtual part if the variable representative of a force is greater than a predetermined value.

33. (Previously added) The method of Claim 32, further comprising, enabling the simulation to be modified, a modification enabling another simulation to be performed, and when the modification causes a change in the virtual part, causing the corresponding model to automatically include the change to the virtual part.

34. (Previously added) The method of Claim 32, further comprising, receiving a user controlled command by a virtual reality peripheral device for arranging of the plurality of parts into the assembly.

35. (Previously added) The method of Claim 32, wherein the virtual environment is formed by a generation of three-dimensional views.

36. (Previously added) The method of Claim 32, further comprising, providing a menu display in the virtual environment, the menu display configured to receive commands from a user by the use of a virtual reality peripheral device.